Taibah University

College of Engineering

Electrical Engineering Department

جامعة طيبة

كلية الهندسة

قسم الهندسة الكهربائية

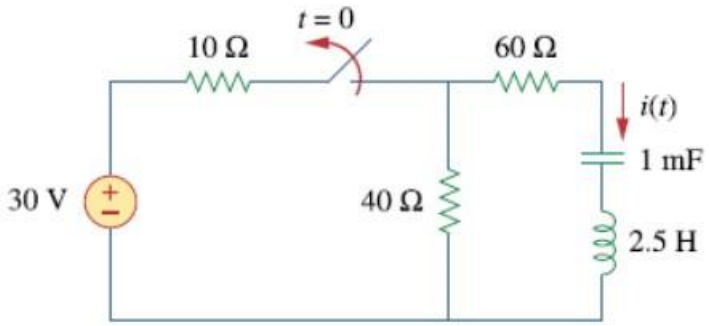
EE 201 Electric Circuits 1 **Final Exam**

19 April 2021

Name:_____ ID Number: _____

Problem # 5:

Given the circuit bellow,



a) What is the initial current across the inductor ?

b) What is the initial voltage across the capacitor ?

c) Find the i(t) for t > 0 in the circuit?

1- Overdamped $\alpha \geq \omega_0$	2- Under damped $\alpha \leq \omega_0$	3- Critically damped
$S_1 = -\alpha + \sqrt{(\alpha)^2 - (\omega_0)^2}$ $S_2 = -\alpha - \sqrt{(\alpha)^2 - (\omega_0)^2}$	$S_1 = -\alpha + j\omega_d$ $S_2 = -\alpha - j\omega_d$ $\omega_d = \sqrt{(\omega_0)^2 - (\alpha)^2}$	$S_1 = -\alpha + \sqrt{(\alpha)^2 - (\omega_0)^2}$ $S_2 = -\alpha - \sqrt{(\alpha)^2 - (\omega_0)^2}$
$i(t) = A_1 e^{S_1 t} + A_2 e^{S_2 t}$	$i(t) = (\mathbf{B}_1 \cos \omega_d t + B_2 \sin \omega_d t) e^{-\alpha t}$	$i(t) = (D_1 t + D_2) e^{-\alpha t}$
$i(0^+) = A_1 + A_2$ $\frac{di(0^+)}{dt} = S_1 A_1 + S_2 A_2$	$i(0^+) = B_1$ $\frac{di(0^+)}{dt} = -\alpha B_1 + \omega_d B_2$	$i(0^+) = D_2$ $\frac{di(0^+)}{dt} = D_1 - \alpha D_2$

Table: Natural Responses of RLC Circuits (SERIES).